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F11N - 3U CompactPCI®/PXI™ Pentium® III SBC

- **32-bit 12 HP CompactPCI®/PXI™**
- **System slot or stand-alone**
- **ULP Pentium® III up to 933 MHz**
- **ULV Celeron® up to 650 MHz**
- **Up to 512 MB DRAM, 128 MB NAND Flash**
- **2 MB SRAM, CompactFlash®**
- **2 Fast Ethernet, COM1, 2 USB 1.1 (front)**
- **Option: COM2 (front)**
- **VGA, keyboard/mouse (front)**
- **Up to 1600 x 1200 pixels**
- **Prepared for 2.5" hard disk on board**
- **FPGA - further programmable I/O functions**

Equipped with either an Intel® ULP Pentium® III or a ULV Celeron® processor core, the F11N single-board computer is a versatile 3U Eurocard CompactPCI® board, taking 8 HP or more front space depending on its configuration. A specially outlined heat sink efficiently takes away the heat from the board, even in extended temperature range. The F11N is designed especially for systems which require low power consumption, e.g. as a computing platform for rugged industrial PCs in mobile applications or for infotainment applications, offering the whole world of Windows® and Linux based software.

The F11N is controlled by an Ultra-Low Power Pentium® III with 933 MHz or an Ultra-Low Voltage Celeron® Processor with 400 MHz or 650 MHz. It provides 512 KB / 256 KB L2 cache. Together with the Pentium® III the 815E Intel® chip set is used.

The F11N provides dual Fast Ethernet via RJ45 connectors and COM1 via a D-Sub connector at the front. Two USB 1.1, graphics (VGA up to UXGA) and keyboard/mouse are also available at the front. The F11N has an SO-DIMM socket, a CompactFlash® socket, and it offers the possibility to mount a 2.5" hard disk on the board.

An on-board FPGA allows implementation of additional functionality such as AC'97 audio (with optical isolation), serial interfaces, CAN bus controllers, binary I/O, protocol converters, touch controller etc. to the needs of the individual application in a very flexible way. Before boot-up of the system, the FPGA is loaded from the boot Flash. Updates of the FPGA contents can be made inside the boot Flash during operation and are available after a re-boot of the system. The FPGA functions are physically implemented on SA-Adapters™. A maximum of 7 SA-Adapters™ can be realized on one F11N, with I/O accessible at the front panel.

The F11N also supports a rear I/O interface for IDE. The pin assignment is compatible with the rear I/O transition module of the F9 Pentium® M SBC. Equipped with a PCI-bridge chip, the F11N offers a full CompactPCI® interface (system slot functionality) for reliable system expansion. The generation of the 3.3 V supply voltage can optionally be made available out of the 5 V while the CompactPCI® system is supplied with 3.3 V.

Last but not least, the F11N's Award BIOS was especially designed for embedded system applications.

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Technical Data

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CPU
- Celeron® or Pentium® III
  - □ 400MHz/650MHz or 933MHz processor core frequency
  - □ 100MHz or 133MHz system bus frequency
  - □ 33MHz APIC bus frequency

Memory
- 256KB or 512KB L2 cache integrated in CPU
- Up to 512MB SDRAM system memory
  - □ One 144-pin SO-DIMM socket for SDRAM modules
  - □ 133/100MHz memory bus frequency
- 2MB SRAM
- CompactFlash® interface
  - □ Type I
  - □ True IDE
- Up to 1GB soldered NAND Flash (and more), FPGA-controlled
- Up to 16MB additional SDRAM, FPGA-controlled, e.g. for video data and NAND Flash firmware
- 2MB boot Flash

Mass Storage
- Parallel IDE (PATA)
  - □ One port for local CompactFlash®
  - □ One port for local hard-disk drive
  - □ Drive can be mounted directly on the CPU board
- Up to 1GB soldered ATA NAND Flash (and more), FPGA-controlled

Graphics
- Integrated VGA graphics controller
- VGA connector at front panel
- Up to 1600 x 1200 pixels

I/O
- USB
  - □ Two USB 1.1 ports
  - □ Two Series A connectors at front panel
  - □ UHCI implementation
  - □ Data rates up to 12Mbits/s
  - □ Supplies High-Power (500mA) without external power supply
- Ethernet
  - □ Two 10/100Base-T Ethernet interfaces
  - □ Two RJ45 connectors at front panel
  - □ Four on-board LEDs to signal LAN Link and Activity status
- Two RS232 UARTs (COM1/COM2)
  - □ COM1: 9-pin D-Sub connector at front panel
  - □ COM2: Physical interface at front panel using SA-Adapter™ via 10-pin ribbon cable on I/O connector
  - □ Data rates up to 115.2kbits/s
  - □ 60-byte transmit/receive buffers
  - □ Handshake lines: CTS, RTS; DCD, DSR, DTR
- PS/2 keyboard/mouse

Front Connections
- VGA
- Two USB 1.1 (Series A)
- Two Ethernet (RJ45)
- Two RS232 UARTs COM1/COM2 (D-Sub)
- PS/2 keyboard/mouse

Rear I/O
- IDE
- Other functions on request
- Mainly compatible with F9 board

FPGA
- Standard factory FPGA configuration:
  - □ Main bus interface
  - □ 16Z125_UART - UART controller (controls COM1..COM2)
  - □ 16Z058_SRAM - SRAM over SPI
  - □ 16Z043_SDRAM - Additional SDRAM controller
  - □ 16Z070_IDEDISK - IDE controller for NAND Flash
- The FPGA offers the possibility to add customized I/O functionality. See FPGA.

Miscellaneous
- Real-time clock, backed up by the carrier board
- Integrated hardware monitor
- Reset button
- 4 FPGA-controlled LEDs

CompactPCI® Bus
- Compliance with CompactPCI® Core Specification PICMG 2.0 R3.0
- System slot
- Double-slot solution (plus 1 mechanical slot for hard disk)
- 32-bit/33-MHz PCI-to-PCI bridge
- V(I/O): +3.3V or +5V (Universal Board)

PXI™
- Prepared for four trigger lines compliant with PXI™ Specification R1.0
- Available on request

Electrical Specifications
- Supply voltage/power consumption:
  - □ +5V (-3%/+5%), 900mA typ. (Celeron® 400MHz), 1200mA typ. (Celeron® 650MHz), 1900mA typ. (Pentium® III 933MHz)
  - □ +3.3V (-3%/+5%), 700mA typ. (Celeron® 400MHz), 700mA typ. (Celeron® 650MHz), 700mA typ. (Pentium® III 933MHz)
- MTBF: 129,000h @ 40°C (derived from MIL-HDBK-217F)

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Mechanical Specifications
- Dimensions: conforming to CompactPCI® specification for 3U boards
- Weight: 560g (incl. heat sink, without hard disk)

Environmental Specifications
- Temperature range (operation):
  - □ 0..+60°C
  - □ Industrial temperature range on request
  - □ Airflow: min. 10m³/h
- Temperature range (storage): -40..+85°C
- Relative humidity (operation): max. 95% non-condensing
- Relative humidity (storage): max. 95% non-condensing
- Altitude: -300m to + 3,000m
- Shock: 15g/11ms
- Bump: 10g/16ms
- Vibration (sinusoidal): 2g/10..150Hz
- Conformal coating on request

Safety
- Electric strength: 500V AC (50Hz)
- PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers

EMC
- Tested according to EN 55022 (radio disturbance), IEC1000-4-2 (ESD) and IEC1000-4-4 (burst) with regard to CE conformity
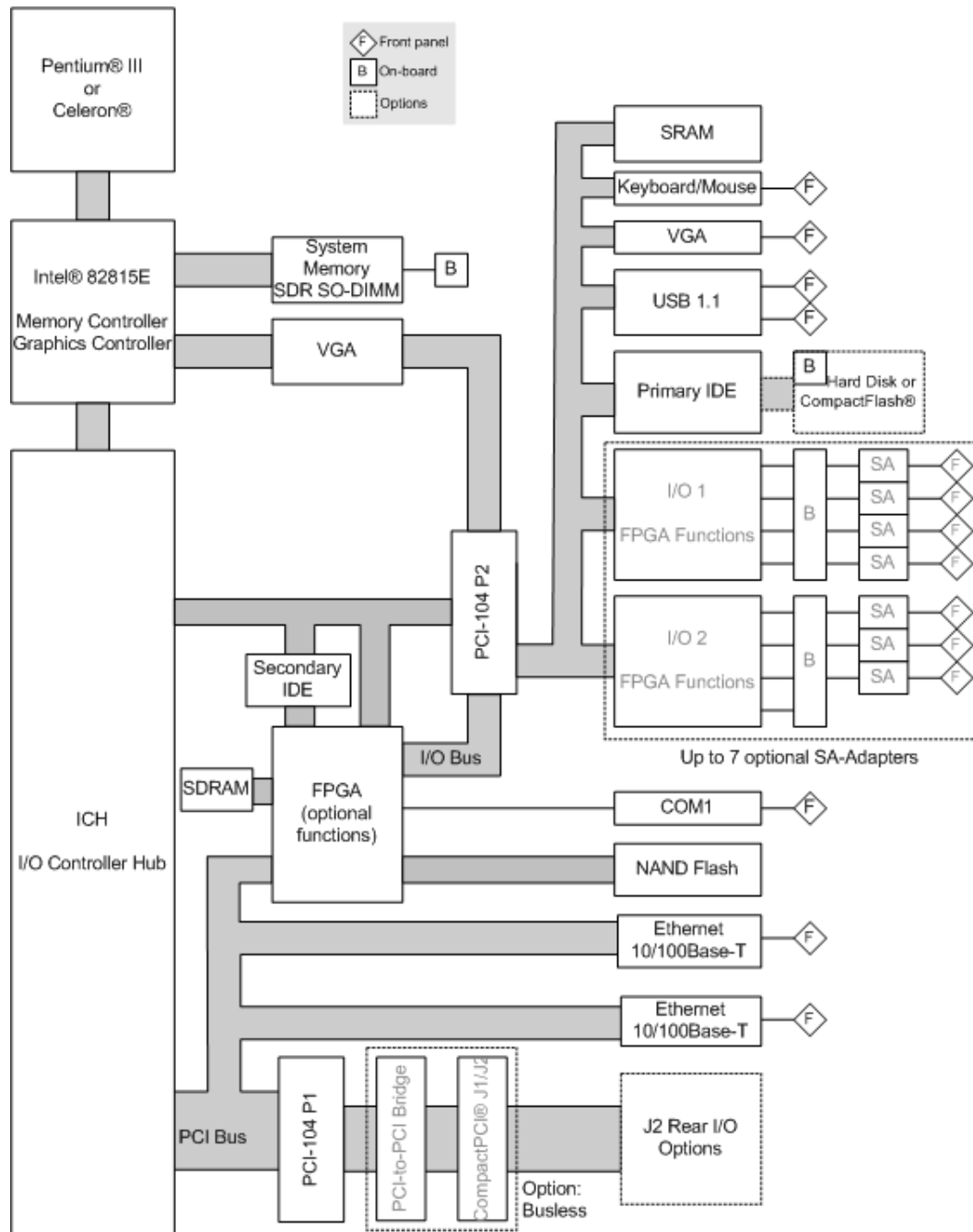
BIOS
- Award BIOS

Software Support
- Windows®
- Linux
- VxWorks®
- QNX® (on request)
- RTX (on request)
- For more information on supported operating system versions and drivers see Software.

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Diagram

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Front panel
On-board
Options

Pentium® III or Celeron®

Intel® 82815E
Memory Controller
Graphics Controller

System Memory SDR SO-DIMM

VGA

ICH
I/O Controller Hub

SDRAM

Secondary IDE

FPGA (optional functions)

PCI-104 P2

I/O Bus

SRAM

Keyboard/Mouse

VGA

USB 1.1

Primary IDE

Hard Disk or CompactFlash®

I/O 1
FPGA Functions

I/O 2
FPGA Functions

SA

Up to 7 optional SA-Adapters

COM1

NAND Flash

Ethernet 10/100Base-T

Ethernet 10/100Base-T

PCI Bus

PCI-104 P1

PCI-to-PCI Bridge

CompactPCI® J1/J2

Option: Busless

J2 Rear I/O Options

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Configuration & Options

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Standard Configurations

Article No.	CPU Type	Clock	System RAM	NAND Flash	CFlash	SRAM	Operation Temperature	Remark
02F011N00	ULV Celeron®	650 MHz	512 MB	128 MB	0 MB	2 MB	0..+60°C	For RIO operation
02F011N02	ULV Celeron®	650 MHz	512 MB	128 MB	0 MB	2 MB	0..+60°C	Without rear I/O
02F011N03	ULP Pentium® III	933 MHz	512 MB	128 MB	0 MB	2 MB	0..+60°C	For RIO operation

Options

CPU
- Type
  - □ ULV Celeron®
  - □ ULP Pentium® III
- Clock
  - □ 400 MHz
  - □ 650 MHz
  - □ 933 MHz

Memory
- System RAM
  - □ 256 MB or 512 MB
- CompactFlash®
  - □ 0 MB up to maximum available
- NAND Flash
  - □ 0 MB up to maximum available
- SRAM
  - □ 0 MB or 2 MB

I/O
- Up to 7 SA-Adapters™
  - □ Functions mostly implemented in on-board FPGA
  - □ RS232, RS422/485, binary I/O, keyboard/mouse, AC'97 audio, CAN...
  - □ Example configuration: 2 CAN, 2 RS485, 1 RS232, 1 digital I/O (5 out, 5 in, 3 in/out), 1 AC'97 audio with optical isolation
  - □ Please ask our sales staff for other possible configurations as not all combinations are possible on the board
  - □ One-piece 3U front panels for different SA-Adapter™ combinations
- AC'97 instead of SRAM

Rear I/O
- Via rear I/O transition module F9R
- Primary IDE (on-board)

CompactPCI®
- 64-bit CompactPCI®, without rear I/O
- Also available as busless version (with external 5V supply)

PXI™
- Four trigger lines compliant with PXI™ Specification R1.0

Operation Temperature
- 0..+60°C
- -40..+85°C
- Depends on board configuration (CPU, ...)

Please note that some of these options may only be available for large volumes. Please ask our sales staff for more information.

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FPGA

FPGA Capabilities
- FPGA Altera® Cyclone™ EP2C20
  □ 12,060 logic elements
  □ 239,616 total RAM bits
- Connection
  □ Available pin count: 21 pins
  □ Functions available e.g. via I/O connector

Flexible Configuration
- This MEN board offers the possibility to add customized I/O functionality in FPGA.
- It depends on the board type, pin counts and number of logic elements which IP cores make sense and/or can be implemented. Please contact MEN for information on feasibility.
- Depending on the hardware platform, SA-Adapters™ can be used to realize the physical lines.

MEN IP Cores
- MEN has a large number of standard IP cores to choose from.
- Examples:
  □ IDE (e.g. PIO mode 0, UDMA mode 5)
  □ UARTs
  □ CAN bus
  □ Display control
  □ ...
- For IP cores developed by MEN please refer to our IP core overview.
  □ IP Core compare chart (PDF)
- MEN also offers development of new (customized) IP cores.

Third-Party IP Cores
- Third-party IP cores can also be used in combination with MEN IP cores.
- Examples:
  □ www.altera.com
  □ www.opencores.org

FPGA Design Environment
- Altera® offers free download of Quartus® II Web Edition
  □ Complete environment for FPGA and CPLD design
  □ Includes schematic- and text-based design entry
  □ Integrated VHDL and Verilog HDL synthesis and support for third-party synthesis software
  □ SOPC Builder system generation software
  □ Place-and-route, verification, and programming
- Altera® Quartus® II Web Edition FPGA design tool

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Ordering Information

Standard Hardware

02F011N00   ULV Celeron® III 650MHz, for operation with rear-I/O card in 32-bit systems, 512MB SDRAM, 2MB SRAM, 128MB Nand flash, 2 Fast Ethernet, 1 COM, 2 USB 1.1, keyboard/mouse, VGA, 0..+60°C

02F011N02   ULV Celeron® III 650MHz, without rear I/O, 512MB SDRAM, 2MB SRAM, 128MB Nand flash, 2 Fast Ethernet, 1 COM, 2 USB 1.1, keyboard/mouse, VGA, 0..+60°C

02F011N03   ULP Pentium® III 933MHz, for operation with rear-I/O card in 32-bit systems, 512MB SDRAM, 2MB SRAM, 128MB Nand flash, 2 Fast Ethernet, 1 COM, 2 USB 1.1, keyboard/mouse, VGA, 0..+60°C

SA-Adapters

08SA01-00   RS232, not optically isolated, 0..+60°C

08SA02-00   RS422/485, half duplex, optically isolated, 0..+60°C

08SA02-01   RS422/485, full duplex, optically isolated, 0..+60°C

08SA02-07   RS422/485, full duplex, optically isolated, -40..+85°C screened

08SA03-00   RS232, optically isolated, 0..+60°C

08SA03-01   RS232, optically isolated, -40..+85°C screened

08SA08-00   CAN ISO high-speed, optically isolated, 0..+60°C

08SA08-01   CAN ISO high-speed, optically isolated, -40..+85°C screened

08SA12-00   Audio codec AC'97, -40..+85°C with qualified components

08SA15-00   8 digital I/O channels, -40..+85°C with qualified components, no RoHS

08SA22-00   IBIS master SA-Adapter™, -40..+85°C screened

08SA22-01   IBIS slave SA-Adapter™, -40..+85°C screened

Miscellaneous

05A000-10   Keyboard/mouse Y-cable 0.1m, 6-pin Mini DIN plug to two 6-pin Mini DIN receptacles

05F006-00   RS232 interface cable RJ45 to 9-pin D-Sub (1 COM to 1 COM), 2m

0710-0009   IDE hard disk 2.5", 9.5mm, 20GB; for mounting on-board (harddisk mounting kit may be additionally required)

0710-0012   Industrial IDE hard disk 2,5", >=40GB, 24 hours/7 days, 0..+60°C; for on-board mounting (hard disk mounting kit may be required additionally)

Software: OS independent

13Z015-06   MDIS4™/2004 driver (MEN) for 16Z029_CAN (MSCAN/Layer2)

13Z016-06   MDIS4™/2004 driver (MEN) for 16Z029_CAN (CANopen master)

Software: Linux

13EM07-90   Linux driver package (MEN) for EM7, EM7N, F11 and F11N

13Z025-90   Linux native driver for 16Z025_UART, 16Z057_UART and 16Z125_UART

Software: Windows

13EM07-71   Windows® network driver (Intel®) for EM7, EM7N, F11 and F11N

13EM07-72   Windows® graphics driver for 815 chipset (Intel®) for EM7, EM7N, F11 and F11N

13Z015-70   MDIS4™/2004 Windows® driver (MEN) for 16Z029_CAN (MSCAN/Layer2)

13Z016-70   MDIS4™/2004 Windows® driver (MEN) for 16Z029_CAN (CANopen master)

Software: VxWorks

10EM07-60   VxWorks® BSP (MEN) for EM7, EM7N, F11 and F11N

Documentation

20APPN004   Application Note: How to make a USB stick bootable

20F011N00   F11N User Manual

21APPN009   Application Note: 16Z025_UART under Linux

22Z125-ER   16Z125_UART Errata

For the most up-to-date ordering information and direct links to other data sheets and downloads, see the F11N online data sheet under » www.men.de.

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